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The Role of Innovative Climate in the Relationship between Sustainable IT Capability and Firm Performance

Turhan Erkmen [1,*], Ayşe Günsel [2] and Erkut Altındağ [3]

[1] Department of Organizational Behavior, Yıldız Technical University, Istanbul 34220, Turkey
[2] Department of Management, Kocaeli University, Kocaeli 41001, Turkey; ayse.gunsel@kocaeli.edu.tr
[3] Department of Management, Beykent University, Istanbul 34396, Turkey; erkutaltindag@beykent.edu.tr
* Correspondence: tturali@gmail.com

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Abstract: Information Technologies (IT) and IT-based capabilities represent a sovereign approach to firm survival and success in today's business environment. The reflections of information technologies on company performance has always been a controversial topic in the management literature. As previous studies examining these kinds of relationships reported mixed results in terms of information technologies efficiency paradox, scholars are still trying to specify the underlying mechanisms and organizational factors linking IT to financial performance. Building on the resource-based view and positioning theory, this paper focuses on sustainable IT capabilities to generate value from IT investments. Moreover, the conflicting results regarding the effects of IT on firm performance lead to questions such as what sort of organizational contexts influence IT usage and enable firms to achieve business goals. This study considers IT capability as a three-dimensional construct—managerial IT capability, technical IT capability, and human support—and investigates the effects of sustainable IT capability on firm performance as well as analyzing the moderating effect of innovative climate. By studying the data from 221 managers of IT companies listed in the top 500 list of Information and Communication Technologies Authority (ICTA), we found that: (1) managerial and technical IT capabilities have significant and positive effects on quantitative performance, all aspects of IT capability—managerial IT capability, technical IT capability, and human support—are significantly and positively associated with qualitative performance, and (2) the relationship between technical IT capability and quantitative performance becomes stronger when the organizational climate is more innovation-oriented. (3) Similarly, the relationship between managerial and technical IT capabilities and qualitative performance becomes even stronger when the organizational climate is more innovative. The study concludes with a discussion of the theoretical and managerial implications.

Keywords: information technologies; firm performance; innovative climate; sustainability; IT capability; IT sustainability

1. Introduction

The contribution of information technologies (IT) to a firm's survival and growth arises as an essential management topic in today's rapidly changing business environment [1–3]. The adoption, effective use, and alignment of information systems and information technology (IS/IT) are critical in this respect [4]. The IT revolution is restructuring the fundamentals of customer service, operations, product marketing distribution channels, and related business practices [5]. Thus, IT is widely considered as a central component of firm capability and a source of sustainable competitive advantage by business managers and academic researchers [2]. Sustainability is a developing, extensive, and

significant issue for mass economies and companies. More than being a concept, it is also a systematic thought that underlines continuity from economic, societal, and ecological perspectives [6].

Discussions on sustainable competitive advantage (SCA) and perceived organizational performance (POP) among academics and practitioners seem to have reached an outstanding level. Unlike traditional organizational systems, existing businesses advocate the importance of IT capabilities and knowledge-based systems [6].

Sustainability, as the foundation of competitive advantage (CA) for the current era's organizations, generates an environment of opportunity for organizations to compete in their competitive areas. Whereas aiming to achieve CA, effectively integrating IT into business processes and deploying sustainable IT capabilities in terms of acquiring SCA have been significant challenges for organizational IT managers. Those organizations who have taken the benefit of their IT capabilities more efficiently have also effectively succeeded in gaining CA either [6].

The effective use of IT capabilities helps organizations in terms of flexibility and adaptability for sustained competitive advantage. Previous studies, mainly with a resource-based view (RBV) and, complementarily to RBV, adopting Porter's [7,8] competitive strategy framework, investigated the identification of significant IT assets and their direct impact on business performance.

Current literature argues that firms with superior IT capabilities perform better than competitors. However, some studies have confirmed that IT investments are related to a firm's production, which neglects efficiency expectations [6].

Indeed, two of the given research perspectives originate from the strategic management literature. The first, i.e., the RBV of a firm, defines a firm as a bunch of resources that are inherently valuable and important in sustainability and emphasizes that a firm's unique resources should determine the fundamentals of its strategy [1,9]. The latter sees sustainable IT capability as a means to gain a competitive advantage by changing the competitive forces that determine industry profitability together. IT takes part among these competitive forces by contributing to either lowering costs or enhancing differentiation [1]. Previous studies suggests that building IT and human capital to develop the organizational knowledge capability may lead to improvements in business processes. Another fundamental determinant of SCA is the organizational knowledge capability of the firm. The knowledge management process has been defined as one of the major causes of SCA in the extant literature [6]. IT involves technical and managerial issues that enable managers to make efficient decisions. The decisions combine organizational and technological capabilities with knowledge capabilities in achieving SCA. Recently, the use of IT at various levels is a requisite for increasing an organization's productivity and improving POP. Firms can form sustainable business models via acquiring knowledge about their customers, markets, competitors, and future technologies since it is regarded that firms can maintain their existence in this dynamic environment by meeting needs and expectations of their customers. Such knowledge serves as a core competence in gaining SCA [6].

Nevertheless, in regard to the extensively held belief that IT is essential to a firm's survival and growth, scholars are still trying to determine the underlying mechanisms and organizational factors combining IT to financial performance [10,11]. IT capabilities have been defined as the "ability to operate a firm's digital network of information to create, control and execute interfirm transactions" [12,13]). Effective and efficient use of IT is widely accepted as a key factor that differentiates successful firms from their less successful competitors. Specifically, Bhatt and Grover [14] argued that by distinguishing a variety of resources and capabilities, a clear understanding of the effects of IT on firm performance may arise. Beccalli [15] claims that information technologies have a direct impact on performance in the banking sector. Wamba et al. [16] found a positive association between big data analyses and firm performance in their empirical research. There is also evidence that most of the companies engaging in high-level IT investments derive no benefits from IT. Many scholars argue that investing in IT does not necessarily result infirm performance [17–19], whilst others recognize a positive link between IT investments, improved efficiency, and effectiveness [20,21]. Nevertheless, there is still a gap in the literature concerning the relationship between IT and firm performance that may be related to several

factors such as unavailable appropriate data, the existence of time lags among IT investments and the business value derived from those investments, the lack of an evaluation of the indirect advantages of IT, as well as the level of analysis of IT-related benefits [16,22]. Concerning this gap, Bharadwaj [10] questions past studies' methodological grounds such as deploying inappropriate measures of IT or using IT investments directly, which may have a long-term effect on performance. To fulfill this gap and to go beyond the IT productivity paradox in the footsteps of Bharadwaj [10], Bhatt and Grover [14], Santhanam and Hartono [23], and Wamba [16], this paper directly examines sustainable IT capability as the "firm's ability to mobilize and deploy IT-based resources in combination or co-present with other resources and capabilities" [24].

Similarly, Chen and his colleagues (2017) emphasized that it is a distinctive tactic for companies that desire to provide strategic flexibility to use information technologies as a lever, especially in developing economies. The existence of dominant companies that provide new technologies to the competitors and suppliers in the same sector and feed them as infrastructure means to be the actors that shape the market, especially for achieving superior performance [25]. From all these aspects, the leading companies in the field of information technologies enable them to gain advantages in many fields, especially in terms of automation, technology development, cost leadership, and operational efficiency. This concept, which is also referred to as IT Governance in some sources [26] and includes strategic, managerial, and operational dimensions, may turn into a managerial phenomenon that will mark the next decade. The most important thing to note is that companies try to apply the IT models that are most suitable for their infrastructures.

When IT capabilities is the main topic to be discussed in relation to firm performance, it will become necessary to mention the importance of big data analysis for companies in order to talk about such a direct relationship nowadays. The term "big data" is often used to create real-time streaming data that require extensive, sophisticated, advanced management, analytics, and processing techniques to gain insight [27]. Companies that do not acquire and adopt these features in a fluctuating and competitive market may have very low chances of survival in the current business environment. People, technology, and management factors are combined in a big data environment, which help each other to boost the broader firm's growth and financial performance. Ensuring this relationship between big data analysis and superior firm performance and grow this based on creating an ideal information technology infrastructure [16,28].

Moreover, the conflicting results regarding the effects of IT on firm performance lead to questions such as what sort of organizational contexts influence IT usage and enable firms to achieve business goals. Many well-known scholars argue that the effect of IT on firm performance may be mediated by a number of intermediate variables [29]. The relevant literature particularly emphasizes the importance of an innovative climate to take full advantage of IT usage (e.g., [30–32]). An innovative climate supports creativity, is risk taking, and is willing to try new things, and encourages open communication among employees across functions [33]. Accordingly, this paper argues that sustainable IT capability makes a significant contribution to firm performance in both quantitative and qualitative terms, along with innovative climate, with its moderating effect on the relationship between IT capability and firm performance. Moreover, firm performance may rectify contradictory evidence from past studies. We selected the managers of IT companies listed in the top 500 list by the Information and Communication Technologies Authority (ICTA) of Turkey to test our hypothesis. Our research model is summarized in the first figure. The remainder of the paper is organized as a review of the relevant literature establishing a clear theoretical ground, a research model describing the related hypotheses, a discussion of the empirical results of the study with theoretical contributions, and managerial implications.

2. Theoretical Background

2.1. Search for a New Perspective on the Link between IT and Firm Performance

When launching IT-dependent strategic initiatives, as well as any others, firms should formulate a plan not only to survive but also to remain a head of the competition [34]. Scholars and professionals often presume that investment in IT will result in profit and productivity gains, which after all creates value for a firm [2]. Investing in IT doesn't guarantee a superior firm performance as IT investments might not be beneficial at all. IT investments should be transformed into IT assets, for instance IT infrastructure and applications. Furthermore, the IT assets should be appropriately used to be of value to the firm [35]. The previous research examining the relationship between IT and firm performance has primarily concentrated on the competitive advantage extracted from IT applications and analyzed the relationship between IT investments and firm performance [35]. In today's rapidly changing business environments, the IT-empowered Knowledge Management Capability (KMC) of organizations play a role as the core competence of organizations for further increasing their performance, innovation, capabilities, and SCA. Moreover, the permanent improvement of IT infrastructure and IT competence can result with a SCA, which emerges as the basis of the firm's performance [6]. There are various studies indicating a positive relationship between IT capability and firm performance, and the results show that the IT capability increases the competitive advantage of a firm. Furthermore, technological capabilities may promote firm performance as a result of creating and using inimitable capabilities [36]. A study by Karagöz and Akgün (2015) also provides empirical evidence in support of the relationship between IT capabilities and firm performance [36]. Consistency in performance is a target that any organization tries to achieve for maintaining a better position in the competitive wide world. Companies can improve their business performance by promoting their IT capability to increase revenues and reduce costs. IT capability can increase product differentiation that result in higher revenues and profits using web technologies. Firms with high IT capability increase their financial performance, productivity, and revenue by obtaining valuable resources such as patents [2,37]. From the perspective of organizational performance and SCA, firms typically improve their IT-based resources and capabilities in order to attain sustainability. As a matter of fact, if enterprises and organizations cling to the previous ITs by ignoring the newly developed and improved ones cannot afford to ignore the significance of improving IT competence and infrastructure if they want to locate themselves in the sustainable business environment (SBE). Undeniably, IT-based improvements and innovations enable the development of a sustainable source for organizational competitiveness. The adopted technologies may also create improved POP and an SCA, as well as resulting with higher efficiency, [6]. The literature is abound with some evidence that proposes IT use in this competitive business world may positively affect social and environmental problems with a specific emphasis on the implications in managing issues of sustainability, consistency, and resilience [4]. Current studies [38] have combined 'IT flexibility' to enhanced levels of strategic alignment under unstable conditions [4]. Research findings demonstrate that this firm-specific characteristic can ensure continuous adaptations and well-timed answers in terms of IT-based competitive actions to achieve SCA [4]. IT capabilities have been found to be related to successful firm performance in terms of costs and profit, financial and market performance, and competitive advantage in turbulent environments. Bharadwaj found that firms with IT capability were more likely to grow financially through increased revenues and reduced costs as a result of combining IT resources with the other firms capabilities [39]. Sambamurthy, Bharadwaj, and Grover (2003) stated that IT investments and capabilities affect the firm's ability to initiate many and various competitive actions that are significant determinants of firm performance. Chircu and Kauffman (2000) claim that a firm can achieve a SCA by using IT capability to exploit specific organizational resources that are unique, and inimitable. Businesses considering sustainable IT face many questions: Does the organization realize that IT is a noteworthy component of its overall sustainability strategy? What is the role of IT in contributing to the organization's sustainability goals? Those questions bring the

responsibility to the IT department in delivering the benefits of sustainable IT across the organization through quantitative and qualitative performance as well as an innovative climate [40].

According to one point of view, IT-enabled resources have an effect on sustainable competitive advantage [41]. The extant literature abounds with evidence regarding the importance of IT in forming a sustainable business atmosphere [6]. Nevertheless, the link between IT investments and firm success seems to be beyond a basic line of reasoning [10]. Academics and practitioners have almost similar problems assessing the contributions of IT. This ambiguity regarding the output and created value of IT refers to the IT productivity paradox. Even dubbing it the "productivity paradox", the debate over the business value of IT investments continues to aggravate even in the support of stronger evidence about payoffs from IT [41]. Due to what we considered a gap in the extant literature, it may be useful to change our point of view following Bharadwaj [10]. Bharadwaj [10] questions past studies' methodological grounds such as deploying inappropriate measures of IT or using IT investments directly, which has a long-term effect on performance. It is not so easy to measure intangible assets, for instance better response to customers and increased coordination with suppliers [42]. Conflicting results may emerge from short-term evaluations [43]. Liu et al. [44] recommend an RBV view of the firm to understand how IT resources and capabilities affect firm performance. To fulfill the given gap and to exceed the IT productivity paradox, this paper directly examines not only investment in IT but the usage of IT capability as a sustainable competitive advantage.

Considering the fact that capabilities are defined as an organization's ability to integrate, and distribute valued resources in combination or co-presence [45]; IT infrastructure and resources have the potential to result in a firm-specific capability that is rare inimitable, and valuable [35]. This is what we call as IT capabilities. Indeed, doubts about IT's direct effects on firm performance have long questioned that firms benefit from IT only when they place IT in a way that produces valuable, sustainable resource complementarity [10]. Corresponding to this assumption, RBV emphasized the functional capabilities of IT as a source of competitive advantage to address the issue of the contribution of IT to a firm's survival and growth [35]. The resource-based view of IT suggests that firms can compete on the basis of their IT resources. A firm's IT infrastructure with human IT skills and its ability to useIT for intangible benefits create a firm-wide IT capability based on firm-specific resources [10]. Furthermore, there is another complementary perspective regarding the relationship between IT and firm performance originating from traditional economic research, i.e., a market power imperative base. The market-driven perspective focuses on industry structure as the primary cause of strategy [1,46]. Accordingly, two related research streams (RBV and MDP) and their point of views toward the consequences of IT capabilities will be discussed in the following section.

2.2. The Resource-Based View

The RBV is originated more directly from strategic management research and underlines the importance of firm-specific capabilities. This stream considers the ability to create distinctive capabilities as a pre-requisite for a firm's survival and success [46]. From the point of RBV; the organizations search for uniqueness, rarity, imitability, and agility in their business models to be competitive in the market [6]. The RBV of a firm takes its roots from Penrose's [47] studies, where a firm is described as a cluster of resources. Penrose suggests that the growth and the success of a firm is both facilitated and bounded by managerial quest for the best use of available resources and capabilities [1]. Resources refer to the stocks of existing factors of production, owned or controlled by a firm. Resources contain assets, capabilities, processes, attributes, knowledge, and know-how that are acquired by a firm. They can be deployed to formulate and implement competitive strategies. Capabilities, on the other hand, express a firm's capacity to take the benefit of those resources within organizational processes. Capabilities can be described as the capacity of a variety of resources to perform organizational tasks or activities and are regularly developed in functional and sub-functional areas by combining physical, human related, and technical resources [10,35].Considering the fact that capabilities are defined as an organization's ability to assemble, integrate, and deploy valuable resources in combination or co-presence [45], IT

infrastructure and resources have the potential to result with a firm-specific capability that is inimitable, valuable, and beneficial for sustainable competitive advantage, which in turn leads to firm survival and success [35]. Accordingly, IT capabilities, involving a firm's abilities to mobilize and deploy IT-based resources in combination or co-present with other resources and capabilities, influence a firm's ability to launch many and varied competitive actions [2,3]. Furthermore, the RBV proposes that firms differ due to their tangible and intangible assets. Therefore, this distinctiveness contributes to gaining competitive advantage. IT capabilities, including tangible assets as well as the intangible ones, supplement human knowledge-building, and the joint execution of both assets so covers the path for building SCA [6]. RBV argues that the implementation of IT has the potential of generating a considerable difference in the POP [6]. IT capabilities include tangible assets and human knowledge-building, and the combination and execution of both assets contribute to the POP which in return paves the path for building SCA [6]. Extending the perspective of RBV, IT scholars have argued that the differences among performances are caused by the differences in ITC and not by differences in IT spending [6]. Recently, studying the dynamics of a RBV of a firm, IT scholars have suggest that organizations should enhance their IT capabilities to gain SCA [6].

The RBV of IT points out that firms can create challenge according to their IT resources. A company's IT infrastructure, human IT skills, and the ability to use IT for intangible benefits are firm-specific resources that create an IT capability across the firm. These are also called the company's core resources. Firms that achieve creating superior IT capability can also enjoy successful financial performance by strengthening firm revenues in addition to decreasing firm costs [10]. According to RBV, a company's competence depends on its ability to effectively manage its key resources (such as people, technology, and capital) to achieve high firm performance. Especially, IT management capability, IT infrastructure capability, and IT personnel capability are the key factors to success [48].

2.3. The Market-Driven Perspective

The RBV emphasizes an "inside-out" or firm-specific view on why organizations succeed or fail [49]. However, RBV's most dedicated followers declare to the relative lack of attention in the RBV literature to opening the black-box through which resources are converted into something that are valuable to external stakeholders [50]. From a MDP, the resources and capabilities, that allow organizations to respond to changing industry and market conditions, provide competitive advantage, hence fulfilling the given gap of RBV [51–53]. The internal capabilities indicate the internal infrastructural or IT capabilities, whereas the external capabilities hold the decision making power of managerial staff in controlling the market turbulence [6]. Superior IT capabilities create a potentially valuable source for reducing marketing cost by increasing switching costs and customer loyalty [37]. Based on the findings of a study, IT capability determines the fundamentals of competition for firms in information-intensive sectors such as banking, telecommunication, retailing, and high-tech manufacturing [2].

RBV and the MDP indeed are the two key approaches considered complementary to each other to achieve competitive advantage [53]. However, the market-driven perspective has a different background than that of the RBV. The market-driven perspective which is based on Porter's [7,8] competitive strategy framework, stresses the role of industry structure to determine the rules of the competition and to influence the framework that is possibly available to a firm [1,46]. According to Porter [7], the key to competitive advantage is the ability to position the company in association with the industry competition. Resources are not valuable alone themselves; rather, their value particularly is related to how well they fit the industry structure and how well they support a particular strategy with a purpose of either targeting an attractive industry or developing a strong competitive position within an existing industry [1,46]. Thus, IT capabilities contribute to either lowering costs or enhancing differentiation in a way that firms can gain a competitive advantage through changing the competitive forces and achieve sustainability in the business environment. Based on stronger human IT resources such as technical and managerial IT skills, firms with better IT capabilities make right decisions about IT spending, IT investment, and IT development that turn into increased productivity, efficiency, better

marketing reflections, increased product quality, and superior customer service. This will also enhance firms' sustainable earnings and help them achieve their strategic goals as well as financial performance and market value [54].

2.4. IT Capability and Sustainability

Capabilities refer to a firm's capacity to deploy a team of resources using organizational processes to perform some task or activity. Capabilities are developed in functional and sub-functional areas by linking physical, human, and technological resources to each other [35]. More than two decades of research discussed several resources such as managerial and technical IT skills, IT infrastructure, and intellectual capital to find out the true value of IT investments [55]. The potential role and value of IT to provide firms with a competitive advantage has been an interesting topic for practitioners and academics. Based on this interest, a broad number of studies have investigated the strategic value of IT and its impact on firm performance. This matter of interest encouraged organizations to make significant investments in information systems and increased the role IT plays in strategic thinking [35]. It is assumed that a firm's IT capability is crucial for its competitive advantage [2]. Accordingly, IT is widely focused in organizations based on its potential to provide extended advantages in competitive settings [56].

The concept of IT capabilities is first introduced by Ross et al. [57] as "a firm's ability to deploy IT to meet strategic objectives". In many following studies, IT capabilities are defined as the "ability to operate a firm's digital network of information to create, control, and execute inter-firm transactions" (e.g., [12,13]). They refer to the capacity to control IT-related costs, to deliver systems when required, and to affect firm objectives through IT implementation [58]. IT capabilities are connected to the skills and abilities of the firm's workforce and signify repeatable patterns of behavior in the usage of the firm's resources and assets [34].

From a more comprehensive perspective, the extent to which a firm mobilizes and distributes IT resources, in association with other abilities and resources as well, is conceptualized as IT capability [10,59]. Indeed, IT capabilities represent a prevalent approach for today's organizations to achieve more business value from their IT investments [60]. In this vein, Stoel and Muhanna [61] claim that IT capabilities are complex bundles of IT-related resources, skills, and knowledge, put into practice by organizational processes, which enable firms to coordinate their activities and utilize IT assets to achieve desired outcomes. IT studies have underlined that IT capacity enables an organization to achieve a competitive advantage over its competitors and improves functionality of the organization [56].

Organizations with superior IT capabilities have an advantage over their competitors based their ability to provide valid and timely information to management for efficient and immediate decision-making [6].

IT-dependent strategic initiatives are based on the effective exploitation of IT to be enacted and are designed to lead to sustained enhancements in a firm's competitive position [34].

IT-enabled resources have a great influence on sustainable competitive advantage. In this view, IT can contribute to firm wealth, value creation, and sustainable performance, in hyper-dynamic and competitive business environments [39]. Therefore, it is crucial to develop a strong business case for sustainable IT projects [40].

IT flexibility is a key facilitator, allowing organizations to develop innovative capabilities and define a huge amount of internal and external issues to achieve SCA [4]. In different terms, the effective use of IT capability of a firm is associated with its sustainability.

IT capabilities exhibit different aspects and facets. For instance, Karagöz and Akgün [36] argue that IT capabilities embrace any related capabilities that enable an organization to create technical and market knowledge and help intra-organizational communication flow. Thus, a variety of dimensions for IT capabilities have been identified in the literature including managerial IT skills, personnel IT skills, technical IT skills, and IT infrastructure (e.g., [3,24,59,62–64]), IT-enabled processes (e.g., [10,35,65]),

and relationship capability and IT business experience [57,59,65–68]. Based on the findings of a recent study, IT capability dimensions are among major sources of big data which will provide maximized firm performance. Therefore, studies that contain IT capability and firm performance may also highlight and encourage further studies about big data and its related sources [28]. As IT capabilities characterize the ability to associate physical and human capital in ways that increase performance, we limit our focus to such capabilities as technical, managerial, and human-based perspectives by following studies by Kim et al. [24] and Garrison et al. [66]. Moreover, those three capabilities seem to be the most common and also the most comprehensive ones in IT related capability studies (see Table 1).

Technical IT Capability: Technical IT capability is related with the different facets or aspects of a firm's IT abilities. Technical IT capability can be described as the ability to develop technical solutions in a quick and effective manner that makes it possible for a firm to efficiently incorporate new IT into an existing infrastructure [66]. Technical IT capability involves the physical and intangible assets that enable a firm to operate in terms of its accessibility and range of shared information [10,69]. The physical and intangible IT assets -e.g., technical knowledge, firm specific know-how, and problem solving processes- enable the firm to successfully and efficiently combine new technologies [66], and these assets compose the basis of a firm's total IT infrastructure, containing the computer and communication technologies and the shareable technical platforms and databases [10,57]. IT infrastructure is composed of such IT elements that are inter-connected and managed by IT specialists with an aim of providing a set of standard services to the organization [34]. IT infrastructure is defined as the extent to which applications and data are able to be shared via communication networks and retrieved for the use of organization [56]. The IT infrastructure is described as a shared information delivery base, the business functionality of which has been defined in terms of its reach and range. The reach is referred to the locations that the platform can access and to which it can link while the range is the kind of information that can be automatically shared across systems and services. As firms develop IT infrastructures that extent entire organizations, connecting key suppliers and customers; they build up complicated rules regarding the distribution and management of hardware, software, and other services. Successful firms learn to redesign their products and services in a way that exploits their infrastructure capabilities [10].

Technical IT capability represents the ability of the IT infrastructure (e.g., applications, hardware, data, databases, and networks) to allow an IT team to develop, use, and support required system components, in a timely manner [24]. Technology infrastructure contains all aspects of the IT capabilities of an organization involving hardware, software, networks, and data storage. Technology infrastructure acts as an integral mechanism in building POP. The literature has supported the part of IT infrastructure in performing POP and therefore achieving SCA. The IT competence of an organization is considered as the organizational members that acquire related IT skills and expertise. The technological competence of an organization's members is connected to new product& service development, which consequently increases POP. If an organization has expert-level human resources, it means that their knowledge can be used as an SCA to provide extra novel products to the market [6]. To use the IT infrastructure with available human resources successfully by offering innovative products and services enhance competitive advantage to a firm's success and thereby create sustainable performance.

Flexible IT infrastructure reinforces information generation and dissemination together, which in turn improve a firm's ability to compete in turbulent environments that lead to CA [39].

Table 1. IT Capabilities.

Studies	Key Variables	Research Type
Mata et al., 1995	• Proprietary technology • Technical IT skill • Managerial IT skill • Access to capital	Conceptual
Ross et al., 1996	• IT human resource asset • Technology asset • Relationship asset	Conceptual
Fenny/Willcoks 1998	• Leadership • Business system thinking • Relationship building • Architecture planning • Making technology work • Informed buying • Contract facilitation • Contract monitoring • Vendor development	Conceptual
Bharadwaj 2000	• IT infrastructure • Human IT resources • IT-enabled intangibles	Conceptual
Basellier et al., 2001	• Knowledge of technology applications and system development • Knowledge of management of IT • Access to IT knowledge and experience • Experience in IT projects and in the management of IT	Empirical
Lee et al., 2003	• Technical specialties knowledge • Technology management knowledge • Business functional knowledge • Interpersonal and management skills	Empirical
Melville et al., 2004	• Technological IT resources • IT personnel resources	Conceptual
Ravichandran/ Lertwongsatien 2005	• Planning • Systems development • IS (Information Systems) support • IS operations	Empirical
Lin 2007	• IT capability • Human capital investment	Empirical
Han et al., 2008	• Managerial IT capability • Technical IT capability	Empirical
Günsel/Tükel 2011	• Technical IT capability • Human support	Empirical
Chen/Tsou 2012	• IT infrastructure • IT relationship resources • IT business experience • IT human resources	Empirical
Kim et al., 2012	• IT infrastructure capability • IT managerial capability • IT personnel capability	Conceptual
Garrison et al., 2015	• Managerial IT capability • Technical IT capability • Relational IT capability	Empirical

Managerial IT Capability: Human IT resources are intangible assets and precursors of a firm's IT capabilities that characterizes the training, experience, and employee insight related to the development one's technical as well as managerial skills and capabilities. While technical skills are about combining emerging technologies into IT infrastructure, managerial capabilities may contain project coordination and leadership skills that enable technology integration. A firm's successful implementation of a new system depends on the IT manager's ability to coordinate multiple activities linked to the implementation [66]. Managerial IT capability refers to the extent to which IT managers have the required business insight and technical skills to predict the promising technologies and leverage them effectively in the alignment of firm processes in accordance with organizational goals [24,66]. To reach their organizational goals, managers should act in the right time and the right position to reach innovative opportunities and technological growth [70]. Indeed, it is the good management to recognize IT as a means of improving the efficiency and effectiveness of business processes, and hence accomplishing firm success [6]. Successful firms often have developed capabilities to connect and align IT. IT alignment rises as a primary management issue due to its potential impact on firm performance [71]. In this vein, managerial IT capability is a bundle of foresight, business insight, and IT know-how that allows an IT manager to optimize IT efforts that are beneficial, e.g., increased sustainable IT capacity and decreased IT expenses [10].

IT-management skills are a source of sustainable competitive advantage because of their socially complex nature and the learning curve connected with their development [34]. Proficient IT managers are good at combining new technologies into existing business processes, effectively coordinate comprehensive activities in the implementation stage [65].

Human Capital Support: A firm's IT strategy should take human dimension into consideration to facilitate organizational learning as a major antecedent of IT success. Accordingly, it becomes important to take into account human resources factors and human capital to be able to evaluate the contribution of IT to a firm's performance. Superior value is created by excellent people, and without the ideas, skills, and leadership of people acquiring the knowledge, firms cannot generate the expected value [2]. Human capital support represents the IT personnel's professional abilities and competencies (e.g., skills or knowledge) necessary to carry out assigned tasks [24]. Human capital support is an important component of the IT asset base as a strategic organizational resource [58]. Indeed, firms can create value from IT infrastructure and resources with the support of complementary human capital [2]. Human capital investment along with IT capability may influence and increase the firm's value. There are two different approaches that explain how human capital can interrelated to IT capability. One approach claims that IT may be a substitute for ordinary factors of production such as unskilled employees. According to the second approach, IT can also be a key factor to accomplish more specialized factors of production such as knowledge workers. Human capital investments, such as training and organizational development, contribute to firm's financial performance by creating economic value based on knowledge-based assets. Firms with the purpose of developing sustainable competitive advantage must focus on attracting, developing, motivating, and retaining excellent employees that can help achieve a successful performance through accomplishing firm's strategic objectives. Employees demonstrating superior skills at creating values should be rewarded [2].

IT capabilities, as a complex combination of IT-related resources, skills, and knowledge, allow firms to coordinate activities by using the IT assets to provide desired outcomes. They enable firms to develop technical and market knowledge and facilitate intra-organizational communication flow [36], which leads to sustainable competitive advantage, provided by the technology-based operations [34]. Greater information transmission across functional areas may result in more successful new products [72]. In line with this result, Lin [2] and Günsel and Tükel [3] reveal that IT capabilities, organized to coordinate activities such as advertising programs or new product development, influence a firm's ability to launch many and varied competitive actions in a superior and agile manner. Garrison et al. [66] found out that IT capabilities positively affect cloud computing success which ultimately leads to higher firm performance. Peng et al. [73] indicate that the consistent integration of IT capability with

firm's ability to optimize business processes and to improve supply chain management can enhance firm performance. Within this line of reasoning, IT capability is also considered as a facilitator of sustainability [4]. Lyver and Lu [39] inform that developing strong IT capabilities is an important antecedent of sustainable firm value. Particularly, IT capabilities take part in the regeneration of firms' competitive position by contributing to either lowering costs or enhancing differentiation to the extent that these activities are distinctive compared with the competitors, and accordingly, superior performance can emerge. Thus, we expect IT capabilities, involving a firm's abilities to mobilize and deploy IT-based resources in combination with other resources and capabilities from technical, managerial, and human-based views increase firm performance in terms of quantity and quality which may lead to a sustainable competitive advantage. Accordingly, our hypotheses are as follows:

Hypothesis 1 (H1). *IT Capabilities: (a) technical IT capability, (b) managerial IT capability, and (c) human capital support will be positively related to quantitative firm performance.*

Hypothesis 2 (H2). *IT Capabilities: (a) technical IT capability, (b) managerial IT capability, and (c) human capital support will be positively related to qualitative firm performance.*

2.5. Innovative Climate as a Moderating Variable

The conflicting results regarding the direct effects of IT capabilities on firm performance raise the question of what sort of organizational contexts influence IT usage and enable firms to achieve business goals. The relevant literature particularly emphasizes the importance of an innovative climate positively influencing IT usage [32]. An innovative climate is facilitative of innovation. It supports creativity, risk encouragement, willingness to try new things, and exemplifies open communication among employees across functions [33]. In an innovative climate, employees at all levels in an organization are expected to contribute to decision making with their creative ideas and data-based tangible evidences, regardless of their job titles [55]. Innovative climate encourages open communication and participation in decision making. Building a sustainability mindset in relation to an innovative climate strengthens business efficiency, reduces consumption and waste, and enhances the company's brand [40].

The definition of innovation is related to the development of a new idea or a new behavior adopted by a firm such as encompassing products, services, devices, technology processes, organizational structures, administrative systems, plans, policies, and programs [39]. The technological innovation is the primary source. Innovation is widely assumed by academics and practitioners contributing to the function of the firm and is also essential for the sustainability of its operations [39] and performance [74]. According to West [75], climates that are supportive of articulate innovation expectations have the approval of and practical support for attempts to introduce new and improved ways of doing work. Identifying the factors that influence the exploitation of IT related assets and resources are crucial. Information technologies have significantly changed the nature of interactions between organizations and networks. Although specific interaction between organizations and networks varies depending on the circumstances, it is believed that organizations that combine their assets, resources, and services can produce more competitive and innovative results [4]. With innovative results, the more substantial competitive advantage of IT capabilities can be a sustainable performance and a source of success.

In this vein, the relevant literature identifies an innovative climate to positively influence IT usage [32]. In fact, a culture and a climate that value information sharing through new ways and technologies are expected to play a key role in IT implementation [30]. For example, project teams in an innovative climate are likely to look for new and different ways of solving problems to enhance productivity [32].

As innovative climate is positively related to exploitation of IT related assets and resources, we expect an innovative climate, enabling the creation of new products, services, and approaches, to contribute to the benefits of IT capabilities in a superior manner, which leads to higher levels of performance. Accordingly, our hypotheses are as follows:

Hypothesis 3 (H3). *Innovative climate moderates the relationships between IT capabilities (a) technical IT capability, (b) managerial IT capability, and (c) human capital support and quantitative firm performance.*

Hypothesis 4 (H4). *Innovative climate moderates the relationships between IT capabilities (a) technical IT capability, (b) managerial IT capability, and (c) human capital support and qualitative firm performance.*

3. Research Design

3.1. Measures

To test the given hypotheses, multi-item scales are adopted from previous studies for the measurement of each variable. Each variable was measured using a 5-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5). IT capability, as a three-dimensional construct composed of managerial capability, technical capability, and human capital support, was used as the exogenous variable. Five items for managerial IT capability and five items for technical IT capability are adopted from Han et al.'s [63] study. To measure human capital support, we adopted a scale of four items from Günsel and Tükel's [3] study, which was originally developed by Benito [76]. The performance scale developed by Alpay et al. [77], which consisted of eight items measuring the qualitative and quantitative performance of the companies, was used. Innovative climate as the moderating variable is measured using the 12 items adapted from Gümüşoğlu and İlsev's [78] perception of support for innovation scale, which is originally developed by Scott and Bruce in 1994.

3.2. Sampling

This study includes a cross-sectional design; a self-reported survey that collected data from top- or middle-line managers, working in a sample of large-sized companies operating in information and communication industry (ITC), located in Istanbul and Ankara, Turkey. Even though only a small part of Turkey is on the European continent, Turkey along with Central and Eastern Europe (CEE) are considered to be a unique group of emerging economies as they are geographically close to each other and they suffer from similar economic conditions and handicaps [79].

Firms in the sample group were originally selected from the reports of the top 500 firm list of Turkey 2016; 177 of the top 500 ICT firms were located in Istanbul, while 127 of them were in Ankara. First, we contacted each firm's general manager by telephone and explained the aim of the study. Of the 304 firms contacted, 92 agreed to participate in our study. We asked at least two respondents, i.e., top or middle line managers, from each firm to participate in the study, who are most experienced in the organization's managerial point of view, technical infrastructure, financial state, and culture in order to reduce the single source bias. An online version of the questionnaire was sent by e-mail to those 92 companies. From those companies, 243 participants responded to the questionnaire. After careful examination, all the incomplete returns with the missing data were dropped, leaving 221 responses for analysis. The findings are based on data from a convenience sample of which 192 of the participants were male (87%). The average age was 37, ranging from 28 to 71; 81% of participants held university diplomas or higher degrees; 83% of the participants were middle line managers; 17% were top managers.

3.3. Analysis

The PLS-SEM technique was used to estimate the measurement and structural parameters in our structural equation model (SEM) [80]. Before conducting any analysis, the firm scores of each question item was aggregated given that the level of analysis of this paper is the "firm". The interrater-agreement (r_{wg}) on firm level measures were needed to be demonstrated, and all r_{wg} values ranged from 0.62 to 0.88. The ranging values of interrater-agreement in context with the study is well above 0.60 which is considered as a benchmark [81], indicating a satisfactory level of inter-rater agreement for each aggregate measure in ICT firm.

We used PLS-SEM technique to test our model because of numerous considerations. First, according to Fornell and Larcker [82], PLS doesn't require many of the restrictive assumptions underlying maximum likelihood techniques and ensures against improper solutions and factor indeterminacy. PLS-SEM does not make any distributional assumptions regarding the indicators or error terms [83]. Indeed, PLS is a latent variable modeling technique that incorporates multiple dependent constructs and explicitly recognizes measurement error. Second, PLS is insensitive to sample size considerations and proper for any sample sizes over thirty in contrast with covariance bases SEM techniques [82,83]. Chin et al. [84], for example, stated that (for PLS) power analysis is based on the portion of the model with the largest number of predictors. Minimal recommendations range from 30 to 100 cases (for Covariance based SEM), ideally based on power analysis of specific model—minimal recommendations range from 200 to 800′. The main consideration for the use of PLS-SEM technique is that our sample size (n = 92 firms) is relatively small. Moreover, PLS handles both reflective and formative constructs [85].

3.4. Measurement Validation

In this study, as Kleijnen, Ruyter, and Wetzels [86] suggest, reflective indicators are used for all our constructs. To evaluate the psychometric properties of the measurement tools, we estimated a null model with no structural relationships. We assessed reliability by composite scale reliability (CR), Cronbach alpha, and average variance extracted (AVE). For all our measures, PLS-based CR is found to be above the threshold value of 0.70; Cronbach alpha goes beyond the threshold value of 0.70; and AVE exceeds the 0.50 threshold value. In addition, we calculated convergent validity by standardized loadings of the measures on their particular constructs and found that all measures have standardized loadings that go beyond 0.54 (see Appendix A). We subsequently evaluated the discriminant validity of the measures. In addition, Table 2 exhibits the correlation among all six variables that provide further evidence of discriminant validity. To totally meet the requirements for discriminant validity, AVE for each construct should be greater than the squared correlation between constructs [82]. Such results addres that the items share more common variance with their particular constructs than any variance the construct shares with other constructs. In our research model, none of the inter-correlations of the constructs goes beyond the square root of the AVE of the constructs (see Table 2).

Table 2. Correlations and Descriptive Statistics.

No	Mean	Standard Deviation	Variables	1	2	3	4	5	6
1	3.52	0.80	MIT	0.84					
2	3.65	0.82	TIT	0.796 **	0.80				
3	3.35	0.93	HCS	0.634 **	0.581 **	0.87			
4	3.66	0.88	InC	0.465 **	0.540 **	0.616 **	0.77		
5	3.88	0.81	QnP	0.442 **	0.532 **	0.516 **	0.392 **	0.89	
6	3.79	0.80	QlP	0.522 **	0.571 **	0.654 **	0.641 **	0.780 **	0.85
			CR	0.86	*0.90*	0.89	0.94	0.91	0.87
			AVE	0.65	*0.71*	0.75	0.60	0.79	0.72
			α	0.90	*0.93*	0.92	0.95	0.94	0.91

* $p < 0.05$, ** $p < 0.01$; $Note_1$. Diagonals represent the square root of AVEs; $Note_2$. MIT = managerial IT capability; TIT = technical IT capability; HCS = human capital support; InC = innovative climate; QnP = quantitative performance; QlP = qualitative performance; CR = composite reliability; AVE = average variance extracted; α = Cronbach's alpha.

3.5. Hypothesis Testing

We used the PLS-SEM approach [87] with the bootstrapping re-sampling method [80] via computing the SmartPLS 3.0 software program to calculate the main in addition to the interaction effects and to test the hypothesis and predictive power of the research model (see Figure 1). This procedure involved generating 5000 sub-samples of cases [84] that were randomly selected, with replacement, acquired from the original data, following the generation of path coefficients. T-statistics

were calculated for all coefficients, derived from their stability across the sub-samples, to determine the associations that were statistically significant. The path coefficients and their associated t-values showed the course and impact of each hypothesized relationship. As Chin et al. [88] suggest, we employed a hierarchical approach for testing the hypotheses; additionally, a model with only main effects (and covariates) was evaluated after the interaction effects were added.

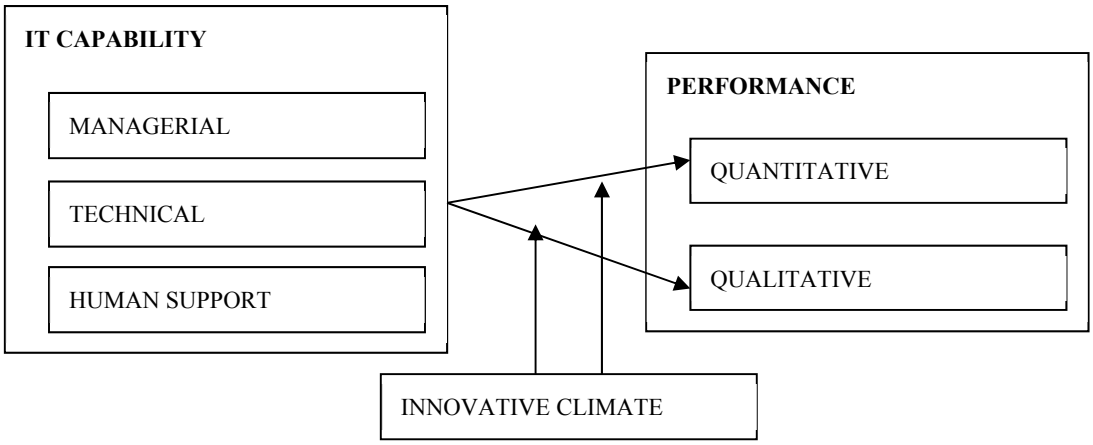


Figure 1. Theoretical Model of the Research.

Table 3 shows the results of hypotheses, including paths, betas, and significance levels. Regarding dimensions of IT capability, the findings demonstrated that managerial IT capability ($\beta = 0.34$; $p < 0.01$) and technical IT capability ($\beta = 0.21$; $p < 0.01$) have significantly positive impacts on quantitative firm performance. Surprisingly, the results provide no empirical evidence in support of the relationship between human capital support and quantitative firm performance. Therefore, H1 is partially supported. Moreover, the findings showed that all the dimensions of IT capability such as managerial IT capability ($\beta = 0.25$ $p < 0.01$), technical IT capability ($\beta = 0.19$ $p < 0.05$), and human capital support ($\beta = 0.43$ $p < 0.01$) were positively associated with the qualitative firm performance, fully supporting H2.

Table 3. Results of Hypothesis.

Relationships			Path Coefficient (β)	Sub-Hypotheses	Sub-Results	Hypotheses	Results
MIT	→	QnP	0.34 **	H1a	Supported	H1	Partially Supported
TIT	→	QnP	0.21 **	H1b	Supported		
HCS	→	QnP	0.22	H1c	Not Supported		
MIT	→	QlP	0.25 **	H2a	Supported	H2	Fully Supported
TIT	→	QlP	0.19 *	H2b	Supported		
HCS	→	QlP	0.43 **	H2c	Supported		
MIT * InC	→	QnP	0.06	H3a	Not Supported	H3	Marginally Supported
TIT * InC	→	QnP	0.17 *	H3b	Supported		
HCS * InC	→	QnP	0.07	H3c	Not Supported		
MIT * InC	→	QlP	0.23 **	H4a	Supported	H4	Partially Supported
TIT * InC	→	QlP	0.22 **	H4b	Supported		
HCS * InC	→	QlP	0.05	H4c	Not Supported		

Note. MIT = managerial IT capability; TIT = technical IT capability; HCS = human capital support; InC = innovative climate; QnP = quantitative performance; QlP = qualitative performance. * $p < 0.05$, ** $p < 0.01$.

A two-step construction procedure was used to address the hypotheses about the moderating effects of innovative climate, i.e., H3 and H4 [88]. The PLS approach enables the explicit estimation of the standardized latent variable scores subsequent to saving the obtained results [89]. To go beyond the collinearity problems, the interaction terms were established by means of the product indicator approach [88], which involves standardizing the items of constructs and computing the interaction term by multiplying each item of one construct with all the items of the moderator. Here, each item

of managerial IT capability, technical IT capability, human capital support, and innovative climate were standardized. After performing this procedure, the standardized question items were multiplied. The whole multiplied results demonstrated that "managerial IT capability and innovative climate," "technical IT capability and innovative climate," and "human capital support and innovative climate" had 55, 55, and 52 indicators, respectively. The inclusion of 172 total indicators for the latent variables, which represent the moderators, does not create a serious issue as PLS path modeling is hardly affected by large numbers of product indicators, as proven by Chin et al. [88]. The results demonstrated positive interaction effects between technical IT capability ($\beta = 0.17$; $p < 0.05$) and quantitative firm performance; hence, H3 is marginally supported. Positive interaction effects between managerial IT capability ($\beta = 0.23$; $p < 0.01$), technical IT capability ($\beta = 0.22$; $p < 0.01$) and qualitative firm performance have been observed; hence, H4 is partially supported. However, the results provided no empirical evidence in support of a statistically significant interaction effect between human capital support and firm performance, neither quantitative nor qualitative when the moderating effect of innovative climate is considered. A significant interaction effect between managerial IT capability and quantitative performance has not been observed, either.

3.6. Structural Model

To confirm the PLS-SEM approach, different excellence scores, such as the coefficient of determination (R^2) [80] and the goodness-of-fit index (GoF) [89], are being considered. The R^2 values of the endogenous constructs are deployed to assess the model fit and show how well data points fit a line or curve [80,89]. Since Chin suggests [81], the classification of R^2 values is small ($0.02 < R^2 < 0.13$), medium ($0.13 < R^2 < 0.26$), or large ($0.26 < R^2$). Besides, we used GoF to evaluate the overall fit of the model, search for a concordance among the performance of the measurement and the structural model in addition to being consistent with the geometric mean of the average commonality and the average R^2 of endogenous latent variables. GoF ranges between 0 and 1, where a higher value characterizes a superior path model estimation. Corresponding to the effect sizes for R^2, using 0.5 as a cut-off value for commonality [82], threshold values for the GoF criteria are classified as small ($0.1 < GoF < 0.25$), medium ($0.25 < GoF < 0.36$), or large ($0.36 < GoF$) effect sizes.

The R^2 values of the endogenous constructs were deployed to reveal model fit [84,85]. Table 3 demonstrates R^2 and GoF values as the fit measures of the structural model. Along with the outcomes of the main effect model, both qualitative performance ($R^2 = 0.40$) and quantitative performance ($R^2 = 0.28$) had large effect sizes. Caused by the interaction effect of innovative climate, the R^2 for the value of quantitative performance in the final model was 0.32, while the R^2 for the value of qualitative performance was 0.57. Similarly, both performances reflected large effect sizes.

Looking at the other fit measure, the result of GoF was 0.61 for the final model and 0.49 for the main effects model. Consequently, the obtained GoF results reveal a large fit (see Table 4).

Table 4. Structural Model.

Fit Measures	Endogenous Constructs	Main Effect Model	Final Model
	QnP	0.28	0.32
	QlP	0.40	0.57
GoF		0.49	0.61

Note. GoF = $\sqrt{}$ average communality × average R^2; QlP = qualitative performance; QnP = quantitative performance.

4. Conclusions

Organizations that exploit IT-based assets, resources, and capabilities are considered to be more innovative and effective, and better at providing immediate responds to spontaneous changes in industry and market circumstances than their competitors. In fact, reciprocally supporting

complementary practices and competences result with superior performance. It is becoming increasingly more evident that IT capabilities are one of the main sources that promote sustainability [4].

In this study, we tried to enhance the RBV and the MDP by offering a model for researchers and managers to understand interrelationships among IT capabilities as a major competitive advantage for sustainability and firm performance. The effective usage of IT capabilities is not only important itself for firm performance but also adds value to the maintenance of a firm's sustainability. Moreover, the conflicting results regarding the effects IT capabilities on firm performance raises the question of what sort of organizational contexts influence IT usage and enable firms to achieve business goals. Other factors such as the philosophy of the management and the structure of organization or the nature of organizational culture in terms of innovativeness may interfere and affect the relationship between IT capability and performance. Based on what has been discussed so far, our study also aimed to reveal the moderating role of innovative climate on the relationship between sustainable IT capability and firm performance. Particularly, this paper makes four contributions to the extant literature.

First, IT capability and firm performance relationship have mostly been studied from the perspective of RBV in the literature as presented in previous sections of our study. In this respect, our study's contribution is not only to analyze the issue from the point of RBV but also to discuss the topic from the point of MDP.

Second, the results of our study show that both managerial and technical IT capabilities have significant impacts on quantitative firm performance. From a "resource-based view," it can be concluded that the technical resources and equipment of IT as well as how successfully the IT resources and technical equipment are administered have an effect on tangible outputs of business organizations through quantitative performance. There are several studies in the literature that our study's findings are consistent with. Greater firm performance in such a big data-oriented environment can be accomplished by an integration of all resources such as organizational resources (e.g. management of big data), physical resources (e.g. IT infrastructure) and human resources (e.g. employees' analytical skills and knowledge) which should be rare and inimitable [28]. Ravichandar and Lertwongsatien [35] stated that an organization's ability to use IT to reinforce its core competencies is related to IT-based capabilities which is ultimately dependent on the structure of human, technology, and relationship resources of its IT department. The results of their study show that intangible IT resources like human, technological, and relationship resources with IT-based capabilities are central ingredients of firm performance. In another study by Sanders and Premus [90], IT capability that is used to acquire, process, and convey information for better decision making impacts performance directly. Chae and Prybutok [37] did not find any discernable evidence for the relationship between IT capability and business performance suspecting that if IT leadership and management could have affected this relationship. Garrison, Wakefield, and Kim [64] questioned if there is a significant relationship between IT capabilities and performance or competitive advantage suggesting that IT, in conjunction with particular organizational and managerial capabilities, creates value that may lead to a SCA. In a study by Mikalef et al. [91], apart from investing in resources, how these resources are managed are also important which draws our attention to the role of managerial dimension of IT capability. Chen and Tsou [58] presume that higher firm performance is achieved when IT and organizational structure are carefully considered in a holistic manner [58]. This finding can be evaluated from a "market driven perspective". In congruence with IT capabilities such as managerial, infrastructure, and personnel capabilities, big data analytic capabilities help to enhance broader firm performance. Managerial capability is critical to optimize decision models whereas technology capability is important to search and control a great variety of data [16]. Zhang, Zhao, and Kumar [54] suggest that IT capability creates a great value for a firm's futuristic measure of firm performance and sustainable accounting performance. According to the findings of this study, human capital support does not seem to have a considerable effect on quantitative performance. Human capital support involves the quality of human capital in business organizations that help a great deal on firm performance through the achievement of a firm's goals. The results of a study by Lin [2] propose that human capital is a precious intellectual

asset that increases firm performance over the long run. Nevertheless, human resource efforts are positively associated with firm performance. IT capability and human capital are strong strategic resources which managers should take into account although it might take a long time to observe the positive gains of such investments [2]. The contribution of human resources on organizational outputs may not always directly be observed in the short term like in quantitative performance, but human resources are among the major elements of intellectual capital that count in long-term success. Human capital is about the creative skills, ideas, competencies, and qualities of employees that are intangible assets contributing to organizational success in the long run. It takes longer time to invest in human capital by developing the required skills and experience to a full extend by also considering the right employee-organization fit to be able to observe a high potential performance. In the context of "resource-based view", technical and managerial resources count more than human resources in quantitative firm performance.

Third, our results show that all dimensions of IT capability—managerial IT, technical IT, and human support—are positively associated with qualitative firm performance. This finding implies to the fact that training employees about new technologies and systems and recruiting qualified people who can effectively use new technologies and systems (e.g., human support) have a positive impact on qualitative firm performance. In addition, technical and managerial dimensions of IT also have positive influence on firm performance in terms of quality, employee and customer satisfaction, and innovativeness.

Fourth, this paper also enriches our understanding regarding the role of an innovative climate for the influence of IT usage on a superior firm performance. Our findings reveal that the moderating effect of innovative climate can only be observed between technical IT capability and quantitative performance as well as between managerial and technical capability and qualitative performance. No empirical evidence has been found in support of the moderating effect of innovative climate either in between human capital support and quantitative and qualitative performance or in between managerial IT capability and quantitative performance. However, in relation to our research model, IT capability with all its three dimensions as technical, managerial, and human support demonstrated positive interaction with innovative climate. This finding draws our attention to the fact that technical resources and equipment as well as an efficient IT managerial support and the right human capital to achieve a firm's goals are associated with a creative, flexible, and innovative environment in an organization which creates value for sustainability as a competitive advantage and success. Studies show that innovation increases firm performance by encouraging organizational members to produce new products and services in order to cope successfully with technology and market changes in the environment. Innovative firms are able to develop valuable capabilities and knowledge that become a part of their organizational culture [36]. However, as discussed previously, among all three IT capabilities, human capital seems to have no direct effect on quantitative performance in the short run, even with the moderating effect of an innovative climate. Similarly, innovative climate does not become a moderating factor in between managerial IT capability and quantitative performance.

4.1. Theoretical Implications

From the point of RBV, such resources as assets, capabilities, knowledge, processes, attributes, and so on refer to the stocks of existing factors of production owned or controlled by a firm. The effective use of such resources may create value for such organizational outcomes as performance. The findings of our study are consistent with the existing literature concluding that IT capability affected firm performance. Among the IT capabilities, only human capital support has no direct influence on quantitative but qualitative performance. The findings therefore justify the resource-based view that resources like IT capabilities are important assets for beneficial outcomes of firms. Moreover, our study also contributes to RBV with implying the role of organizational context (e.g., innovative climate in this study) in the use of IT capabilities (e.g., technical and managerial in this study) that result in firm performance. From the perspective of RBV, our study's findings also show that the effective

use of IT capability as an innovative resource may also help firm's competitive success in the context of sustainability.

The market-driven perspective that is based on Porter's competitive strategy put forwards that the key to competitive advantage is the ability to position the company in association with the industry competition. Porter [7] implies that a firm may gain superior performance by examining the market forces and using such forces in developing strategies that provide competitive advantage. The findings of our study show that to be able to achieve a successful performance in a competitive and rising market like the information and communication technology industry, the use of IT capabilities play an important role and provide competitive advantage for organizational success. For positioning the firm in the market, the context of the firm should comply with the market expectancies. An innovative and competitive industry like ICT requires firms to have innovative work environments. Therefore, the effective use of IT capabilities associated with an innovative climate may enable firms to create strategic and sustainable advantage for a firm's performance and success. The results of our study from this aspect support the market-driven approach.

4.2. Managerial Implications

It is interesting to analyze and consider the case of Intel's company experience in order to comprehend the value of sustainable IT. Intel IT's experience demonstrates that selecting an fitting stance for sustainable IT, along with a structured methodology to growing that capability, can provide solid financial and environmental savings while helping businesses to meet their overall sustainability targets [40]. Business managers of firms should not only invest in IT but should look for opportunities of creating a firm-wide IT capability. According to Bharadwaj [10], IT managers who estimate the strategic importance of IT capabilities must proactively train the senior management about the importance of IT activities and look for opportunities to improve such capabilities [35].

Considering the overall results of our study, managers can be recommended to not only invest in IT resources but create an innovative, flexible work environment that will better serve and make beneficial usage of IT for higher and sustainable firm performance. To achieve that, IT resources should be managed by a well-qualified management team that will support creative ideas and projects contributed by organizational members. Successful projects and ideas should be reinforced and rewarded to maintain participative employees. Firms must adopt and develop a combination of data such as technological, human, and organizational resources from the perspective of big data analysis to create a capability that is inimitable to transfer [91]. In the personnel selection process, candidates with high creativity, IT competences, knowledge, and skills, as well as effective managerial skills such as risk taking, openness to innovations, and effective decision making, should be carefully analyzed and recruited. The current employees along with the new ones should be supported with training programs that contain improving IT competencies and skills, as well as creative and analytical thinking. The indicators of firm performance should be determined accurately, and performance reviews should be integrated with successful IT capability usage. Investment in human capital may not be observed in the short run, but it may have a great impact on organizational results through the use of their capabilities particularly in future sustainable firm performance. Therefore, management should carefully consider supporting the human capital in strategic management processes in order to expect tangible benefits through the participation of their creative ideas, skills, and knowledge for the long-term success and sustainability of the firm. Participative management should be one of the main management philosophies of firms to value human capital. The role of organizational context (e.g., innovative climate) in the use of firm capabilities through organizational success is another critical factor that managers should concentrate on. To create and develop a strong firm culture that support an innovative and creative work environment should be among the main focus of firms and their managers. To be able to do that, a common language and understanding for sustainable IT should be created and active involvement of employees with innovative ideas should be encouraged. In addition, incentive programs should be activated to support and reinforce innovative ideas. IT

capabilities should carefully be analyzed and the required investments to IT should be provided by also considering how innovative IT usage can be important for achieving sustainability as a competitive advantage for a firm's performance. Firms should continuously invest in both technology and human resources for future success. The sources of the firm that compose strategic advantage via capabilities should effectively be allocated.

4.3. Limitations and Future Research

Some methodological limitations exist in this study. First, this study was conducted in a specific industrial context, the IT sector. Thus, readers should be careful in generalizing the results to different industries. Even though this sample selection seems to be a methodological limitation, it was done purposely. The reason behind the choice of the IT sector in this study is the rapidly changing nature of the IT industry in the whole world; firms of this industry are constantly making investments to acquire new/updated skills [92] such as IT-based capabilities. Turkey is a developing country at the beginning steps of technological progress; hence, it is important to analyze the issue in this sector in Turkey. A relatively small sample size (n = 92 companies) may be another limitation. Since Turkey is a developing country with an emerging ICT, it was a challenge to access ICT at international standards.

Moreover, since using cross-sectional data is one of the noteworthy limitations of this paper, questions may emerge about the causal direction and aim of the relationships among the constructs. Even though the method of surveying is regarded as be a large and growing area of research in the business studies [93], the method used here (only questionnaire) may not provide totally objective measures and outcomes about the flow of knowledge. For example, it is quite uncertain how managerial perspective, technical developments, and personnel-related issues upon IT will evolve and how those evolvements will be reflected in firm performance in the long term. Due to cross-sectional data and the issue of restricted time, academicians may consider collecting longitudinal data, particularly to monitor the sustainable results.

In particular, based on the fact that that the same respondents replied the dependent variable as well as the independent ones in a cross-sectional approach, common method biass a possibility for this paper. This problem was caused by the fact that it was really a challenge to access the software development, ICT companies as well as the developers and the users. To go beyond this limitation, we used Harman's one-factor test. The results reveal that none of the factors significantly dominated the variance. The literature involves many examples in which the dependent variables, including quality and other IT related outputs, are measured by the same respondents [94–96]. Indeed, ICT and software-related performance measures such as customer satisfaction are often evaluated from a manufacturing point of view, which is best assessed right through the life cycle of development by the ICT specialists, developers and managers; due to the fact that assessing IT-related outputs extend the perceptions of the single customers [97–100]. In addition, a number of recent studies have found that IT specialists and managers are able to judge IT-related performance items together [100,101].

This study is limited to three dimensions (technical, managerial, human) of sustainable IT capability. In future studies, other indicators of IT capability, such as IT alignment, IT business experience or vendor management, IT architecture, and IT relationship assets, can be placed and tested in research models. Particularly the human support dimension was found to have no impact on quantitative firm performance and should be examined in forthcoming studies from different aspects to discern whether or not an interaction could be detected. Because there is a significant interaction between IT capability dimensions (technical, managerial, human) as supported by our study, the human support dimension may have an impact on firm performance via the other two IT capability dimensions. In future studies, different instruments to measure IT capability can be used to test and see their interaction with other variables.

Other than an innovative climate, different variables as moderators can be involved in the existing research model, e.g., organizational culture, environmental dynamism, resource availability, resource flexibility, leadership, and so on. Moreover, future research may find it fruitful to examine the

non-linear ways of IT resources and capabilities to go a step forward. Here, a configurational analytic framework, that is quite different from the traditional linear paradigm may offer a new way of thinking about IT-based capabilities in the context of the interconnected, non-linear digital world. Following Park et al. [102] and Mikalef and Krogstie [103], academic scholars may use fuzzy-set qualitative comparative analysis (fsQCA) to reveal the impacts of environmental contingencies and the importance of complementary organizational factors, which can effectively manage the rising complexity of a configurational perspective. Moreover, the research model can be enriched with new dependent variables, such as sustainable competitive advantage or firm agility. Big data analytical approach can also be included in future studies. Finally, the time interval can be selected as a variable to make comparisons between IT companies in terms of their seniority and experience in the business.

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Appendix A. Measures

Standardized loadings are in parentheses.

CR: composite reliability; α: Cronbach alfa, AVE: average variance extracted; r_{wg}: inter-rater agreement

*: denotes the dropped item; either they reduce the AVE to less than 0.50, or they have low loading weights.

IT Capability

Managerial IT Capability (Adapted from Han et al., 2008)
We know our functional requirement (0.72)
We have ability to integrate functional requirement (0.89)
We have ability to leverage IT as strategic core competence (0.87)
We have the blueprint of IT strategy in accordance with business strategy (0.88)
We have ability to continuously update IT strategy according to the change of business environment (0.85)
CR = 0.86
α = 0.90
AVE = 0.65
r_{wg} = 0.71

Technical IT Capability (Adapted from Han et al., 2008)
We have knowledge and technical ability of IT (0.76)
We understand the role of IT to improve business performance (0.79)
We have our scheme for IT standardization (0.81)
We have ability to integrate IT (0.83)
We understand the trend of IT (0.82)
CR = 0.90
α = 0.93
AVE = 0.71
r_{wg} = 0.75

Human Capital Support (Adapted from Benito, 2007)

In our company, employers are submitted to training programs about new software and systems. (0.83)

In our company, employers are submitted to training programs about new equipment and tools. (0.90)

In our company, we prefer to hire qualified people who can effectively use new technologies and systems. (0.89)

In our company, we emphasize on using information and communication technologies in order to support the communication flow between our customers and our suppliers. (0.84)

CR = 0.89

α = 0.92

AVE = 0.75

r_{wg} = 0.79

Innovative Climate (Adapted from Gümüşoğlu and İlsev (2009), originally developed by Scott and Bruce, 1994)

Creativity is encouraged here. (0.84)

Our ability to function creatively is respected by the leadership. (0.83)

Around here, people are allowed to try to solve the same problems in different ways. (0.81)

This organization can be described as flexible and continually adapting to change. (0.56)

This organization is open and responsive to change. (0.82)

A person can easily share his/her innovative ideas with the people in charge *

Assistance in developing new ideas is readily available. (0.75)

There are adequate resources devoted to innovation in this organization. (0.77)

There is adequate time available to pursue creative ideas here. (0.78)

This organization gives me free time to pursue creative ideas during the workday. (0.75)

The reward system here encourages innovation. (0.85)

This organization publicly recognizes those who are innovative. (0.83)

CR = 0.94

α = 0.95

AVE = 0.60

r_{wg} =0.62

Firm performance (Adapted fromAlpay et al., 2008)

During the last three years, our company is performing better than the competitors based on the given criteria below

Quantitative Performance

Total sales (0.86)

Market share (0.91)

Increase in return (0.91)

General profitability (0.89)

CR = 0.91

α = 0.94

AVE = 0.79

r_{wg} = 0.88

Qualitative Performance

Quality of products and services (0.85)

Customer satisfaction (0.87)

Employee satisfaction (0.83)

The number of the new products and services launched (0.86)
CR = 0.87
α = 0.91
AVE = 0.72
r_{wg} = 0.80

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